VMM discussion

Michael Lupberger (CERN)
SRS + VMM

FECv6 with D-Card connects to VMM hybrids

VMM ASIC: Readout chip for ATLAS NSW
- 130 nm CMOS technology
- VMM3 delivered: end 2016
- Configuration via CMOS lines (data+clock)
- 64 channels (preamp and shaper, ADCs)
- Output: digitised data (38 bit/hit), 0-supp.
- Up to 200 MHz clock
- Self triggered

VMM hybrid:
- Two VMM ASICs
- Spartan6 FPGA
- LDOs for power
- Protection circuit

Adapter card:
- Mainly SVDS drivers
- Can read up to 8 VMM hybrids
- Work on possible master/slave ongoing
VMM

News from ATLAS (from RD51 Miniweek)

<table>
<thead>
<tr>
<th>Issue in VMM2</th>
<th>Circuit</th>
<th>Status in VMM3</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handling sTGC rates</td>
<td>analog front-end</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early saturation</td>
<td>current-out peak detector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADC accumulation</td>
<td>ADCs</td>
<td></td>
<td>improve</td>
</tr>
<tr>
<td>Pulser DAC saturation</td>
<td>DAC bias circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulser rise-time and noise</td>
<td>pulser circuit and injection switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prompt output disabled</td>
<td>control logic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event loss</td>
<td>ADC reset logic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold bit error</td>
<td>discrimination logic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCID advance-latch issue</td>
<td>Gray-code counter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other data integrity issues</td>
<td>data, token &amp; FIFO logic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counter turnaround</td>
<td>counter logic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front-end off w/SFM</td>
<td>analog front-end</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak detect hold time</td>
<td>hold node</td>
<td></td>
<td>not tested</td>
</tr>
<tr>
<td>Buffer float at bypass</td>
<td>buffer input stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High baseline (5% samples)</td>
<td>baseline stabilizer</td>
<td>(✓)</td>
<td>yield, workaround</td>
</tr>
</tbody>
</table>

By George Iakovidis
### News from ATLAS (from RD51 Miniweek)

<table>
<thead>
<tr>
<th>New Function in VMM3</th>
<th>Circuit</th>
<th>Status in VMM3</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle STGC capacitance &amp; charge</td>
<td>analog front-end</td>
<td></td>
<td>impact of protection resistor</td>
</tr>
<tr>
<td>Tail cancellation</td>
<td>analog front-end</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trimming range extension</strong></td>
<td>trimmer analog/logic</td>
<td></td>
<td>3/4 of targeted</td>
</tr>
<tr>
<td>L0 handling logic</td>
<td>digital implementation</td>
<td></td>
<td>stress tests in progress</td>
</tr>
<tr>
<td>Simultaneous readout</td>
<td>various logic changes</td>
<td>(☑)</td>
<td>locking, workaround</td>
</tr>
<tr>
<td>CMOS IOs config. and new reset</td>
<td>config. logic and IOs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLVS-400 IOs</td>
<td>digital interface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing ramp optimization</td>
<td>timing circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeout ramp autoreset</td>
<td>timing circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquisition reset on ENA</td>
<td>control logic</td>
<td>(☑)</td>
<td>single event, workaround</td>
</tr>
<tr>
<td>32-channel skip</td>
<td>inter-channel logic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ART flag synchronization</td>
<td>ART logic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEU tolerance</td>
<td>logic</td>
<td></td>
<td>tests queued</td>
</tr>
<tr>
<td>Pulser range extension</td>
<td>injection circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing ramp at threshold</td>
<td>timing circuit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*By George Iakovidis*
News from ATLAS (from RD51 Miniweek)

- VMM3 is being extensively tested at several institutions, and five residual issues have been found two from VMM2 still present in smaller amount:
  - ADC resolution (10b > ~7b and 8b > ~6b)
  - trimming (3/4 of planned extended range)
  - there have a workaround
    - direct output locking in ToT, workaround TtP
    - acquisition reset on EN, workaround CS
    - 5% high analog baseline, workaround STLC

- VMM3 solved all readout stability issues we found in VMM2, added many more features

- VMM3 will be tested for SEU in Democritus Greece under Neutron irradiation in Spring 2017

- Revision to fix residual issue recommended, if schedule allows on May 2014 (Going to production for ATLAS) although the current version looks that it is enough good for trigger + readout (charge & timing measurements of high precision).
VMM

Clarification

From Vinnies summary slide @ Mini week in December

- No export license needed
  - CERN working for a universal license for all ASICs fabricated by Global Foundries, please check with P. Farthouat

Triggered fear/misunderstanding regarding availability of VMM for certain regions = export restrictions

George and Vinnie solved this misunderstanding:

- CERN works on license for all Global foundries chips
- VMM might be included if this puts no limitations
- BNL works on license with goal: no export restrictions

VMM3 production: ATLAS is working on it
SRS + VMM

Detector electronics chain

- SRS crate with power supply
- Detector with VMM hybrids
- Adapter card
- Network switch
- SRS FEC
- HDMI cables
- Computer with data acquisition software
- Ethernet cables
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Detector electronics chain

VMM Hybrid → HDMI cable → Adapter card + FEC → Ethernet → Switch → Ethernet → PC
SRS + VMM

High VMM power consumption: Power Box

- 8 x short local HMDI cables A-D male-male (M+S)
- 8 x VMM direct power cables
- VMM power box
  - (M+S splitter)
  - 43 x 130 x 175
- 4 x HDMI A-A cables any length to DVMcard
- LEMO Reset
- Power input 12V
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Power Box: Options

VMM power / connectivity plan

2k VMM channels = 1 DVM/FEC
16 VMM hybrids
max 50 Watt
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VMM3 hybrid with new connector
VMM

Availability

VMM3

- 4 hybrids at CERN
- ~32 VMM3 in stock, possibility to get 1-2 dozen more
  could build 16 up to 30 more hybrids (still on Panasonic)

more VMM3

- Low quantities: join next ATLAS production for prototypes
- Large quantities: join ATLAS NSW mass production
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Availability

D-Card:
- 2 at CERN + 1 that needs to be fixed
- For final version: minor power routing and outline changes

FEC
- You will need the FECv_6
- Available at CERN store or directly from Samway also via SRStechnology.ch
- Power box: one prototype
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Manpower at CERN GDD

- Alex Rusu: (VMM hybrid, Dcard) (25% for 3 month by ESS)
- Hans: (50% @ CERN GDD lab as unpaid member)
- Michael Lupberger: 100% @CERN GDD lab

very limited → need help from the community / possible users

Things to be done:

- Master/Slave option with boundary conditions: use with power box, master only when directly connected to D-Card, hybrids must be identical, (FPGA code must be identical)

→ upgrade VMM to M/S mode (FPGA code) make Dcard M/S capable (power routing)

- VMM Cooling, Panasinic-Hirose adapter, ...
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VMM3 hybrid first price estimate by Alex

- ~ factor 2 more compared to APV25 when in production
- Depends on production quantities:
  - >500 hybrids → 250 chf/hybrid (~2x APV25)
  - 100 hybrids → 450 chf/hybrid
  - 50 hybrids → 680 chf/hybrid
  - 10 hybrids → 920 chf/hybrid (APV25 protos where about the same)
  - 1 hybrids → 4000 chf/hybrid

Need small quantity phase for prototyping before large production
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VMM3 ASIC RD51 order

- Next production (small quantities)
- ATLAS mass production

Request received: ASICs

- Lev Shekhtman (Novosibirsk): 4/20
- Dorothea Pfeiffer (ESS): 24/96